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PERSPECTIVES OF THE USE OF RENEWABLE ENERGY SOURCES IN THE REPUBLIC OF BELARUS IN THE FRAMEWORK OF ENERGY AND ENVIRONMENTAL SAFETY MANAGEMENT

The Republic of Belarus belongs to the category of countries that do not possess significant own fuel and energy resources. Renewable energy is one of the significant components of the energy and environmental security of the Republic of Belarus. In recent years, no single type of electric generation in the country has developed as intensively as renewable energy, taking into account the maximum possible involvement of local energy resources in the fuel and energy balance.

The development of renewable energy sources is one of the areas of long-term sustainable development of world energy. According to forecasts, by 2035 world energy consumption will increase by 41 % compared to 2012, while the share of renewable energy sources (RES) will grow from 5 % to 14 %. Renewable sources will remain the fastest growing form of energy with an annual growth rate of 6,4 % [1].

Unconventional and renewable energy sources include sources that use the energy resources of rivers, reservoirs and industrial drains, wind, solar, reduced natural gas, biomass (including wood waste), wastewater and municipal solid waste. From the point of view of the level of profitability and development trends, the main segment of the global market for «clean technologies» is biofuel (bioethanol, biodiesel), solar and wind energy.

According to the annual statistical compendium on the global energy market, renewable energy sources became the fastest growing source of energy in 2016 too. Without hydro energy, consumption of renewable energy grew by 12 %, demonstrating the largest increase in the year over the entire observation period (+53 million toe). More than half of the growth in this sector was provided by wind energy (+ 16 % per year). Solar energy production increased by 30 %. And although solar energy accounts for only 18 % of the production of renewable energy, it provided almost a third of the total growth of renewable energy sources. China has become the largest producer of renewable energy sources used in the power industry, surpassing the United States. The Asia-Pacific region ranked Europe and Eurasia on this indicator [2].

The Republic of Belarus belongs to the category of countries that do not possess significant own fuel and energy resources. In accordance with the Concept of the National Strategy for Sustainable Development of the Republic of Belarus for the period until 2035, the strategic goal of the development of the fuel and energy complex is to meet the needs of the economy and the population of the country for energy carriers based on their maximum efficient use while reducing the environmental load. An important vector is universal access to affordable, reliable, sustainable and modern energy sources. In the long term (2026–2035), systematic work will be continued on the application of advanced technologies, ensuring the achievement of the set criteria for energy security and environmental policy. The development of Belarusian energy will also be aimed at expanding the use of renewable energy technologies, one of the main results of the effective functioning of the fuel and energy complex will be the ratio of primary energy production from renewable energy sources to gross consumption of FER – at least 9 % [3].

Renewable energy is one of the most important components of the energy security of the Republic of Belarus, in recent years not a single type of electrical generation in the country has developed as intensively as renewable energy. In 2016, the total capacity of renewable energy installations increased by 1,6 times by 2015, in 2017 – by 1,8 times by 2016. According to estimates of the Belarusian State Standard Energy Efficiency Department, by 2020 the total installed capacity of renewable energy in Belarus will exceed 1000 MW, the total capacity of installations for the use of renewable energy should increase to 6 % of the gross consumption of fuel and energy resources (FER) and about 7 % – of the total power system capacity. This indicator is formed, including, taking into account the use of wood fuel, biomass and other renewable energy resources for the production of thermal energy.

Biomass is the cheapest and most large-scale form of renewable energy storage. The annual growth of organic matter on our planet is equivalent to producing such amount of energy, which is ten times more than the annual energy consumption of all mankind at the present stage. Bioenergy is considered the production of energy from both solid biofuels (chips, briquettes, pellets or pellets from wood, husks, straw, etc.),

and the production of biogas. The main areas in the production of energy from biomass are: crop waste; biogas from animal waste; firewood and wood waste; phytomass and municipal waste. Bioenergy also includes the use of artificially grown biomass (algae, fast-growing trees). The use of crop waste as well as potential energy contained in municipal waste generated on the territory of Belarus as fuel is a fundamentally new direction of energy saving for the Republic of Belarus.

Small hydropower operating from the flow of small rivers, canals, etc. For this purpose, dams with a small backwater are used, underwater placement of hydraulic units along rivers, «garland» power stations in the form of blades rotating on submerged cables. In Belarus, hydropower plants with an installed capacity of less than 0,1 MW are allocated to the category of micro-hydro power plants, it is considered to be small hydropower plants with a capacity of 0,1 to 30 MW, with the restriction imposed on the diameter of the impeller of a hydro-turbine up to 2 MW and a unit capacity of 10 MW. The potential capacity of all watercourses in Belarus – 850 MW, including the use of 250 MW economically feasible – it is up to this level that they intend to bring the total capacity of small hydropower plants in Belarus by 2020.

The Republic of Belarus belongs to countries with low wind potential, since wind energy can be successfully used at its speed of 5 m/s or more. At present, 1840 sites have been defined on the territory of Belarus for locating wind farms with a theoretically possible energy potential of more than 1,6 thousand MW. Today, 14 wind power plants with a total capacity of 20,15 MW have been installed and are functioning on the Novogrudok Upland. During 2017–2019 construction of another 12 wind power plants is planned, including commissioning of the plant as part of the Green Economy international project of the European Union and the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus.

The use of solar energy is determined by meteorological conditions, in the Republic of Belarus an average of 250 cloudy days per year, 85 are with variable cloudiness and only 30 clear days. In this connection, for the conditions of Belarus in the forecast period, the production of solar energy will be almost negligible. By 2020, Belarus plans to build solar power plants with a total capacity of 250 MW. Taking into

account the climatic conditions of the Republic of Belarus, the main areas of solar energy use are solar water heaters and various solar power plants to intensify drying processes and to heat water in agricultural production and for domestic purposes.

Geothermal energy is the direction of energy, based on the production of electrical energy from the energy contained in the bowels of the earth. It is promising to introduce heat pumps that can convert low-grade energy of land, water, industrial and municipal waste into heat energy for heating buildings and structures.

In general, the presented trend of development of renewable energy in the Republic of Belarus is very promising and corresponds to similar trends in Europe. One of the most important factors of energy security is to increase the level of security of energy needs through its own energy resources. Increasing energy independence in the country should be carried out taking into account the maximum possible involvement of local energy resources in the fuel and energy balance, above all, renewable energy sources while reducing the burden on the environment.

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